PENNSTATE ARL

iMAST QUARTERLY

Institute for Manufacturing and Sustainment Technologies

Powered by Naval Research

A U.S. Navy Manufacturing Technology Center of Excellence

2004 No.2

Surface Preparation Implementation

As part of a U.S. Marine Corps Maintenance Center surface preparation improvement effort, ARL Penn State engineers have been working with the Marine Corps and industry to address challenges facing logistics base depots chartered to repair or replace combat weapon systems and components in a timely, affordable, and environmentally friendly manner.

The expeditious return of combat equipment to the operational forces has direct impact on fleet combat readiness. The proper investment and application of repair technology at the depots also offers positive gains to the Marine Corps in terms of the procurement cycle, since successful repair activity reduces replacement requirements thereby allowing the Marine Corps to leverage its limited procurement budget. In a time of conflict, this can often be judged a force multiplying effort.

Repair facilities operate as multi-commodity maintenance centers. These highly flexible and constant centers are integral parts of Marine Corps Logistics Bases, which support the operating force by providing the continuous readiness and sustainment necessary to meet operational requirements.

Marine Corps Logistics Base Albany recently augmented its media blast systems as a result of an earlier Navy ManTech effort that sought to improve pre-paint surface preparation operations at the MCLB Albany depot. The Surface Preparation Improvement project was primarily focused on the identification and evaluation of environmentally-acceptable paint stripping solutions that could be used to replace the (largely ineffective) n-methyl pyrrolidone paint stripping system in use at the depot. ARL and the MCLB Albany were successful in identifying a paint stripper and paint stripping process which was effective in removing all of the various paints encountered by the depot. During the course of this work, ARL Penn State identified a number of components and situations in which a non-aggressive mechanical paint removal method would be easier and more cost-effective than current methods.

SpongeBlast™ is an engineered blasting material that can be tailored to any desired aggressiveness. Essentially, abrasive particles (more than one type and

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Focus On Repair Technologies

Report Documentation Page

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IN THIS QUARTERLY

DIRECTOR'S CORNER

Take Advantage of Us

As you read this, we will be executing in the new fiscal year. We have proceeded a long way toward shifting our focus to the new design carrier. While we are still finishing up several on-going projects, most of the projects are focused on CVN 21. As such, we are teamed with Naval Surface Warfare Center (NSWC) Carderock, Philadelphia detachment, and Northrop Grumman Newport News on several projects.

I am encouraged with our partnership with NSWC as they bring an expertise with fleet integration and operation that compliments our skill areas. Our teaming with Newport News Shipbuilding will ensure that projects are focused on implementation. Our primary focus is on reducing costs.

The war on terrorism and the war in Iraq are placing huge demands on equipment operation. The high operations tempo, coupled with smaller fleet assets, place a requirement on maximizing availability. The effect of improving availability is placing more assets in the hands of the warfighter. Programs such as Sea Swap, where crews are rotated through deployed ships, increase the availability on station by removing a number of transits. This, however, places an increased demand on the ship, which is not afforded the opportunity for intensive maintenance. As such, depot maintenance periods must be able to handle the effects of the increase operation and longer periods between availabilities. We must find ways to improve efficiencies of maintenance periods to minimize the time the asset is not available to the warfighter. Likewise, cost reduction is a priority in this period of funding constraints. The Repair Technology (RepTech) program is focused on maximizing the efficiency of the Navy and Marine Corps Shipyards and Depots. Our engineers, working with depots, tailor emerging technologies to solve challenges and improve repair practices. If you have a special need or a technology which would benefit the depot community, I encourage you to contact me or Sean Krieger, my RepTech Manager.

The Office of Naval Research has supported the iMAST center to make the talents and dedication of innovative engineers of Applied Research Laboratory available to help solve challenges for the Navy and Marine Corps. Sometimes we can help with just a phone call. Other times we can send an expert to provide another "set of eyes" to take a different view of the issue. If we don't have the expertise in house, we should be able to direct you to someone who can help. Bottom line, we are here to support your efforts. Take advantage of us!

Bob Cook

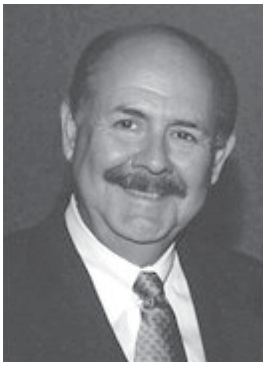
PENNSTATE iMAST

- MATERIALS PROCESSING TECHNOLOGIES
- MECHANICAL DRIVE TRANSMISSION TECHNOLOGIES
- LASER PROCESSING TECHNOLOGIES
- COMPLEX SYSTEMS MONITORING TECHNOLOGIES
- ADVANCED COMPOSITES MATERIALS TECHNOLOGIES
- NAVY/MARINE CORPS REPAIR TECHNOLOGIES
- MANUFACTURING SYSTEMS TECHNOLOGIES

iMAST's Bob Cook (l) and ARL Penn State's director, Dr. Ed Liszka (r), brief Congressman John Murtha on ARL on a full-scale next generation underwater weapon system program, while ARL's Tom Goodall and Patricia Gruber (far right) look on.

Showcase for Commerce

iMAST recently participated in the annual Johnstown Showcase for Commerce forum in Cambria County, Pennsylvania. The showcase provided an additional outreach opportunity to meet with industry and other research organizations in the area. Industry support by Lockheed Martin, United Defense, DRS Technologies, General Dynamics, and The Boeing Company attests to the level of quality participation this event attracts. iMAST will continue to use forums like the Johnstown Showcase to highlight the potential of the U.S. Navy's Manufacturing Technology program. The showcase is particularly helpful in providing smaller business organizations an opportunity to interface with key players in the research and development world, as well as large manufacturers, and DoD customers. The annual Johnstown Showcase is scheduled again for next June. Stay tuned for more information.



Manufacturing Czar Nominated

Mr. Albert Frink has been nominated to become the first assistant commerce secretary for manufacturing and services. The position will "advocate, coordinate and implement policies" that will help the U.S. manufacturing sector compete globally. The U.S. has slowly been transitioning from a manufacturing economy to a service and information society. Relative to the economy and national security, experts warn the U.S. cannot afford to abandon its leadership in the manufacturing arena. This has been the compelling case for continuing the DoD ManTech program. Force readiness and force modernization are fundamental needs of the warfighter. Defense budget reductions in recent years have increased the burden on the Department of Defense (DoD) to satisfy both readiness and modernization objectives. Affordability along with reduced cycle times for acquisition of new systems and repair of existing systems are key to ensuring the United States maintains an appropriate mix of systems and forces ready to respond to the defense missions of the future. Warfighters need a responsive industrial base with advanced manufacturing technologies and processes that reduce costs and lead times at every level and phase in the design process, including up-front attention to designing for sustainment, in development, in production, and in the support of fielded systems. Achieving implementation of affordability improvements and cycle time reduction are the predominant aims of the ManTech Program.

Navy TechMatch

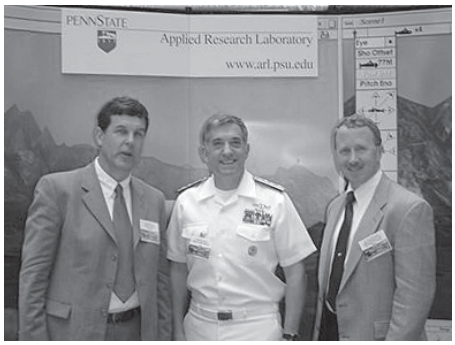
We want to take this opportunity to introduce you to Navy TechMatch, a new Navy support site sponsored by the Office of Naval Research. Located in Fairmont, West Virginia, Navy TechMatch is a web-based support site administered by the West Virginia High Technology Consortium Foundation. Navy TechMatch is designed to provide valuable information to facilitate more effective interaction with the Naval Research and Development community. On the Navy TechMatch site you will find Technology Needs, Research & Development Opportunities, Calendar of Events, Laboratory Information, Success Stories, and other related web sites. Registered Users will benefit from receiving timely information in selected technology areas. You can register with Navy TechMatch by going to the following web site: <www.Navytechmatch.com> or by contacting Brad DeRoos at (304) 366-2577 (ext 288). Send regular correspondence to: Navy TechMatch (attn: Brad DeRoos), WVHTC Foundation, 1000 Technology Drive, Fairmont, WV 26554.

Colonel Paul Croisetiere, USMC, NAVAIR H-53 program manager, visits iMAST administrator Greg Johnson at the Penn State Rotorcraft Technology Center of Excellence exhibit booth.

AHS Forum 60

The 60th annual American Helicopter Society Forum was recently held in Baltimore, MD. iMAST and Penn State's Rotorcraft Technology Center of Excellence participated together once again. This year's theme "Vertical Flight Transformation" highlighted the role vertical flight capability will play in the Department of Defense's transformation effort. The forum once again drew large industry participation, with guest speakers journeying from all corners of the United States, Canada, Europe and Asia. The forum provided an excellent opportunity to communicate recent developments in the advancement and application of vertical flight technology.

AHS 61 will be held in Grapevine, Texas next year (1–3 June 2005). For more information about AHS, call (703) 684-6777, or write Mr. Rhett Flater, Executive Director AHS, 217 N. Washington Street, Alexandria, VA 22314. You can also send e-mail to <ahs703@aol.com>. Visit the AHS web site at <http://www.vtol.org>. For more information about Penn State's Rotorcraft Center of Excellence, contact Dr. Ed Smith at (814) 863-0966 or visit their web site at <http://www.psu.edu/dept/rcoe/>. To learn more about ARL's Air Vehicle Technology Group contact Greg Johnson at (814) 865-8207, or visit the iMAST web site <http://www.arl.psu.edu/centers/imast.html>.



iMAST Director Bob Cook (l) and ARL Associate Director for Materials and Manufacturing, Tom Donnellan (r) share moment with RAdm Jay Cohen, USN, Chief of Naval Research and host of the fifth annual ONR Naval-Industry R&D Partnership Conference, held at the Ronald Reagan Trade Center Building in Washington, D.C.

Annual ONR Naval-Industry R&D Partnership Conference Concludes

iMAST once again participated in the Office of Naval Research annual Naval-Industry R&D Partnership Conference in Washington, D.C. Designed to promote dialog between government, industry, academia, and the U.S. Navy and Marine Corps, the conference leverages corporate research and development efforts for the Department of the Navy through a series of interactive breakout sessions that provide forums for serious discussion of challenges facing the defense industrial base. Special guest speakers complemented a progressive agenda that included discussion area topics which address technology insertion opportunities. The forum also provided a chance to meet various Navy program managers and suppliers. Next year's conference will once again be held in Washington, D.C. Check future iMAST newsletter calendar of events for the date and location.

DDR&E Recognizes Wess

Mr. Dennis B. Wess, a research associate at Penn State's Applied Research Laboratory, and Navy ManTech project leader, was recognized recently by the Joint Defense Manufacturing Technology Panel (JDMTP) for his Landing Craft Air Cushion (LCAC) Lift Fan Bearing Seal project work. John Todaro, Director of the Office of Technology Transition, Office of the Director of Defense Research and Engineering, recently commended Mr. Wess for work that has "...a significant positive impact on future production of our weapon systems." ARL Penn State and iMAST take great pride in its supporting relationship with the U.S. Navy, Marine Corps, and the Department of Defense.

PEO Ships Visits iMAST

Rear Admiral Charles Hamilton, Program Executive Officer (Ships) visited the Applied Research Laboratory recently as part of a capabilities review. During his visit, Admiral Hamilton received briefings on various iMAST ManTech projects to include: Collarless Construction Techniques for DD(X); Manufacturing Laser-Welded Stiffened Structures for CVN21; Advanced Surface Ship Watertight Enclosures; Automated Thermal Plate Forming for DDX, SSN688 Vertical Launch System Tube Repair; and ARL's contributions to the Composites Manufacturing Technology Consortium's current efforts which include large marine composite-to-steel adhesive joint; CVN 21 composite applications for weight reduction; improved fabrication technology for ASDS stator; and composites manufacturing technology for the Expeditionary Fighting Vehicle (formerly AAAV) troop ramp door.

Dr. Ed Liszka, director of ARL, discusses program efforts with Congressman Jack Murtha.

iMAST Participates in ARMTech 2004

Members of ARL recently participated in the annual Armstrong County Technology Showcase in Kittanning, PA. Participation at these events is considered an important part of the Navy ManTech implementation process. As with any technology, the ability to transfer and implement depends on finding appropriate industry partners. Events like Armstrong County (western Pennsylvania) Technology Showcase provide an opportunity for government, academia and industry to meet in order to identify and exchange new ideas for technical innovation. This, in turn, provides a vehicle which can enhance the production and performance of DoD-related products at an affordable cost to the U.S. taxpayer.

RAdm Jay Cohen, Chief of Naval Research, presents Patrick Bergan with a $5,000 check in recognition of Mr. Bergan's program efforts. In addition to the cash award, a large plaque, prominently displayed at ONR, will have Mr. Bergan's name engraved for all to see.

Bergan Receives ONR "Cheapskate Prize"

Mr. Patrick Bergan, a technical assistant with the Naval Undersea Warfare Center Division at Keyport, Washington, has been awarded an Office of Naval Research (ONR) "Cheapskate Prize" for his role in an Institute for Manufacturing and Sustainment Technology (iMAST) Navy ManTech repair technology effort involving torpedo repair and laser paint stripping.

ONR's "Cheapskate Prize" was established to recognize and reward individuals for notable science and technology achievements that promote the affordability of future naval capabilities. Mr. Bergan spearheaded a program initiative that resulted in a cost-avoidance of over $1M for the Navy. This cost-avoidance was realized within the first six months of project implementation.

iMAST leads the way in fostering the insertion of repair technology into the Department of the Navy's operations and service cycle process. Chartered to improve capabilities in the remanufacture and repair communities of the U.S. Navy and Marine Corps, iMAST's repair technology (REPTECH) program leverages Navy ManTech resources by partnering with industry and the systems commands in such a way to achieve utility as well as cost-savings and cost-avoidance. iMAST congratulates Patrick Bergan for his service and a job well done.

For more information iMAST's Navy ManTech Repair Technology (REPTECH) program, or ONR's "Cheapskate Prize for Affordability," contact Sean Krieger at (814) 863-0896 or by e-mail at <slk22@psu.edu>.

DDX ManTech team members assembled for demonstration of large scale adhesive application technology at the Composite Materials Division Laboratory at ARL. l-r: Jim Sabo (CMTC), Terri Merdes (ARL), John Sullivan (Northrop Grumman), Keith Toepfer (Northrop Grumman), Eric Strauch (ARL), Erik Takacs (ARL), Bruce Jackson (General Dynamics-Bath Iron Works), Chris Vaccaro (Boeing), Ray Bohlmann (Boeing), George Ritter (Edison Welding Institute), Jeff Smith (General Dynamics-Bath Iron Works), Greg Dillon (ARL), Chris Rachau (ARL), Larry Brown (Edison Welding Institute), Clark Moose (ARL), Tom Juska (ARL). Missing from photograph are Kirsten Lipetzky (NSWC Carderock), Derek Lang (ARL), and Bob Ferlez (ARL).

DDX ManTech Meeting

iMAST recently hosted a team meeting for the DDX ManTech program at Penn State. This project is focused on the demonstration of large scale composite to metal adhesive bonding for the deckhouse of the next generation destroyer. Composite materials are required for the DDX to allow for weight reductions relative to traditional all-metal constructions. Structural adhesive bonding, which have never been attempted on such a large scale before, are favored over bolted assembly because of further cost and weight advantages. Team members from Edison Welding Institute (lead), Boeing-St. Louis, Bath Iron Works, Northrop Grumman Ship Systems (Ingalls), and NSWC Carderock attended the two day meeting which consisted of program progress reviews, and laboratory visits. Large scale adhesive application methods developed by ARL's Composite Materials Division were demonstrated. Application of down-selected technologies are planned for early 2005, when ARL will also lead an activity in Non-Destructive Inspection (NDI) technology aimed at providing automated, high-sensitivity quality assurance techniques that can be implemented at the shipyards. Distributed Spread Spectrum (DSS) Ultrasonic signal processing capabilities, which have been under development at ARL for some time, will be combined with state-of-the-art ultrasonic hardware to provide inspection capability well beyond current systems. ONR was represented by Jim Sabo of the Composite Manufacturing Technology Consortium, which is administered by the South Carolina Research Authority (SCRA). SCRA acts as Navy's administrative agent on composite ManTech programs.

Heavy Expanded Mobility Tactical Truck (HEMTT) arrives at ARL Penn State as part of overall ARL Penn State Ground Combat/Combat Service Support Vehicle Technology Group effort.

Heavy Expanded Mobility Truck Reports for Duty

ARL Penn State has been loaned a Heavy Expanded Mobility Tactical Truck (HEMTT) in support of a project effort to help develop and integrate a hydraulic system health monitoring capability on the Load Handling System (LHS) A2+ version of the HEMTT. The HEMTT is an on/off road vehicle manufactured by Oshkosh Truck Corporation in five basic configurations, including the M977 cargo truck with Material Handling Crane (MHC). There is also the M978 2500 gallon fuel tanker, M984 wrecker, and the M983 tractor. The HEMTT LHS is based on the M977 version of the truck, designed to load and unload all classes of military supply. It is capable of transporting up to 22,000 lbs. of cargo to troops in the field. The mission of the HEMTT is to continuously re-supply troops in the field. As part of the project, ARL's System Operations and Automation Division will create a hydraulic system model to demonstrate the interactions between valve positions, pressure levels and cylinder positions, which will facilitate the development of diagnostic reasoning and the evaluation of fault detection and isolation techniques. ARL will also develop hydraulic system diagnostic algorithms and fault localization reasoning to allow for monitoring, detection and isolation of hydraulic system failures using the HEMTT LHS hydraulic health monitoring system hardware currently resident on the test vehicle and the hydraulic model developed by Penn State ARL. Health monitoring system testing on the vehicle system will also address functional testing and seeded fault testing to evaluate fault monitoring, detection and isolation capability. ARL will also determine the architecture and the path to implementation on how to best interface HEMTT diagnostic and advanced diagnostic information into higher level integrated data environments (IDE), decision support systems and enterprise management systems such as that being developed under GSCC-Army. For more information on this program and ARL's Systems Operations and Automation capabilities, contact Jeff Banks at (814) 863-3859, or by e-mail at <jcb242@psu.edu>.

COVER STORY CONTINUED FROM PAGE 1

grit size can be used) are blended into a polymeric material which foams up into a large sponge-like mass. The sponge/abrasive mixture is then ground into the desired "macro-particle" size. The SpongeBlast™ blasting media has been finely tuned to effect fast, controllable paint removal. The SpongeBlast™ media may also be recovered and recycled for as many as 20 cycles before it breaks down to the point where it is no longer recoverable.

Iterative stripping process.

By definition, SpongeBlast™ abrasive is a composite material. The embedded abrasive effects paint removal, while the sponge matrix prevents the hard cutting abrasive from penetrating the paint layer. In addition, the sponge-like nature of the SpongeBlast™ binder prevents shot-peening of the substrate. This combination of hard-cutting abrasive and sponge matrix allows the paint to be sanded or eroded away with exquisite control. SpongeBlast™ acts as "floating sandpaper", without the expense or injuries associated with manual sanding operations.

Having identified an off-the-shelf technology that could benefit the depot, ARL contacted USTechnology, Inc. the makers of SpongeBlast™ blasting material. ARL Penn State's Charlie Tricou previously worked with the SpongeBlast™ personnel on the development of an aerospace-grade sponge-blasting material. The SpongeBlast™ project manager (Lawrence Stone) agreed to hold a demo on-site at the MCLB depot in Albany, GA. USTechnology funded the material and equipment that were delivered to MCLB Albany depot. The SpongeBlast™ crew and ARL Penn State's Charlie Tricou traveled to Albany and set up shop in an area provided by the depot.

With nearly all blasting personnel and floor managers in attendance, several light aluminum pieces, coated with sea-foam green epoxy paint, were blasted. One of the demonstration items had a label that had been overcoated with the sea-foam green epoxy. USTechnology was able to quickly remove the paint from the label, leaving the lettering on the label intact and readable. Several of the blasters from the depot used the system and found it to be effective and easy to use.

This technology is particularly suited for removing paint from light aluminum and composite structures. Paint removal from light aluminum and composite structures is typically performed using manual hand-sanding. SpongeBlast technology is particularly functional when it comes to selective coating removal. It is also fast and effective in scuff-sanding of already-painted surfaces prior to additional overcoatings.

MCLB Albany maintenance team.
Supporting the FMF.

SpongeBlast™ is not a panacea for all coating removal operations. For example, it is faster and less expensive to remove heavy coatings from steel structures using steel grit. But as a tool in the abrasive blasting toolbox, SpongeBlast™ has the potential to save the Marine Corps and other DOD facilities a substantial amount of money, while reducing solvent use and substantially reducing repetitive motion injuries.

The Albany MCLB depot and the maintenance directorate are to be commended for the level of support provided during this technology demonstration. For more information about iMAST's coatings removal effort, contact Charlie Tricou at 814-863-4459, or by e-mail at <cst101@psu.edu>.

CALENDAR OF EVENTS

18–21 Oct.	Expeditionary Warfare Conference		Panama City, FL
25–27 Oct.	AUSA Expo		Washington, D.C.
25–28 Oct.	DoD Maintenance Conference		Houston, TX
26–28 Oct.	AGMA Fall Technical Meeting		Milwaukee, WI
3–4 Nov.	Impact Prognostics and Health Management CBM Course		Orlando, FL
17–18 Nov.	Materials and Manufacturing Advisory Board Meeting		State College, PA
29 Nov.–3 Dec.	DMC 2004	★★★★★★★ *visit the iMAST booth*	Las Vegas, NV
1–2 Dec.	Light Armored Vehicles Conference		Washington, D.C.
2005			
22–24 Mar.	Navy League Sea-Air-Space Expo	★★★★★★★ *visit the iMAST booth*	Washington, D.C.
23–24 May	Johnstown Showcase for Commerce	★★★★★★★ *visit the iMAST booth*	Johnstown, PA
1–3 Jun.	American Helicopter Society Forum 61	★★★★★★★ *visit the iMAST booth*	Grapevine, TX
Aug. TBA	TechTrends 2005	★★★★★★★ *visit the ARL booth*	TBA
Aug. TBA	ONR Naval-Industry R&D Partnership Conference	★★★★★★★ *visit the iMAST booth*	Washington, D.C.
Aug. TBA	ARMTech 2005	★★★★★★★ *visit the iMAST booth*	Kittanning, PA
Sep. TBA	Combat Vehicle Conference		Ft. Knox, NY
13–15 Sep.	Marine Corps League Expo	★★★★★★★ *visit the iMAST booth*	Quantico, VA
Oct. TBA	Expeditionary Warfare Conference		Panama City, FL
Oct. TBA	DoD Maintenance Conference		TBA
Oct. TBA	AUSA Expo		Washington, D.C.
16–19 Oct.	AGMA Gear Expo 2005		Detroit, MI

Quotable

"Readiness, advanced technology, dominance of the maritime domain, and the genius of our people—these are our asymmetric advantages... And we intend to accelerate these advantages over the coming year."

—Admiral Vernon E. Clark, USN, Chief of Naval Operations

PENNSTATE

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